

Jeffrey C. Johnson

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Citizenship: U.S. Citizen
Veterans Preference: None

EDUCATION:

Doctorate of Philosophy, 2010, Mining Engineer, University of Utah, Salt Lake City, UT.
Masters of Science, 1986, Mining Engineer, University of Utah, Salt Lake City, UT.
Bachelors of Science, 1981, Mining Engineer, University of Utah, Salt Lake City, UT.
Diploma, 1976, Brighton High School, Salt Lake City, UT.

PROFILE:

Hired August 1, 2016 as an Associate Professor in the Department of Mining Engineering. Previously worked 30 years at NIOSH Spokane Mining Research Division (SMRD). Taught seven classes; Mine Visits, Introduction to Mining, Mining Seminar, Rock Mechanics Applications, Engineering Design, Mine Surveying, and Mechanics of Materials. Assisted in the teaching of Geomechanics Plasticity. Papers, authored two as lead and two co-authored. One proposal finished and ready for submission. Co-PI of one invited research proposal. Member of the safety and college curriculum committees. Accepted by Technology and Venture Commercialization (TVC) invention of an instrumented split-set rock bolt to measure both rock mass stress and strain change. Associate editorial board member in *Aspects in Mining & Mineral Science (AMMS)*. Position title changed to Associate Professor of Practice in 2019.

PROFESSIONAL EXPERIENCE:

Associate Professor of Practice	Dept. Mining Eng., Univ. UT	Dates: 8/2019 - Present
Associate Professor	Dept. Mining Eng., Univ. UT	Dates: 8/2016 – 7/2019
Mining Engineer	NIOSH\OMSHR\SMRD	Dates: 6/2013 – 7/2016
Visiting Professor	Montana Tech	Dates: 8/2012 - 5/2013
Mining Engineer	U.S. Bureau of Mines\NIOSH	Dates: 7/1986 - 7/2012

Supervisor: Dr. Michael Free, Mining Department Chair Dates: 8/2019 – Present

Present Position: Associate Professor of Practice, Dept. of Mining Engineering Dates: 8/2019 – Present

Teaching Courses:

Rock Mechanics Applications (MG EN 5160)
Mechanics of Materials (MG EN 5150)
Engineering Design (MG EN 5040)
Mining Seminar (MG EN 4990)
Mine Surveying (MG EN 3400)
Mine Visits (MG EN 3015)
Introduction to Mining (MG EN 3010)
Assisted with the teaching of the graduate class Geomechanics Plasticity

Student course feedback reports from all classes have mostly been above average. Majority of students reported that they agree or strongly agree with all teaching questions.

Research:

In the process of inventing an instrumented split-set rock bolt to measure both stress change and rock mass strains. Invention may have commercial value. Proposal submitted to NIOSH/ Spokane Mining Research Division (SMRD) to obtain funding where verbal interest was expressed on September 6, 2018 by a visiting SMRD researcher for possible funding later this year. If not accepted by SMRD, I will submit it as a CMES seed grant proposal.

Lead author on a paper with Dr. Miller and Dr. Lin (Department of Metallurgy) to experimentally confirm relationship between Bond's work index (BWI) and kinetic energy (KE) using test results from dissertation research. I calculated the energy absorbed from rock damage tests used in comparing BWI and KE described in the paper.

Currently assisting Dr. Calizaya as a co-PI in procuring new research funding from an invited Alpha Foundation letter. The present focus has been on locating a coal mine to perform positive pressure balancing tests.

Published and presented as lead-author the paper entitled "Biaxial stressmeter instrument sensitivity to bedded transverse isotropic material" at the American Rock Mechanics Association (ARMA) on June 17, 2018.

I co-authored the papers "Managing engineering talent; challenges to optimize the best and brightest" with faculty from Montana Tech and "Numerical study of the relationship between seismic wave parameters and remotely triggered rockburst damage in hard rock tunnels" with researchers from NIOSH/SMRD.

Service:

Member of two college committees; safety and curriculum.

Laboratory rock breaking demonstrator for high school students on Science and Engineering Days.

Undergraduate advisor and have written many letters of recommendation for the students for various scholarships, internships, and graduate school admissions.

With Rio Tinto, I led a group of students to document old mine working in the Death Valley National Park.

Along with the mine visits class, I invited two representatives from the Utah Governor's Office of Energy and Development to join us to learn about mining in Utah.

Judge of past three years (2016 – 2018) for the Rotary Club of Park City, Utah "Miners' Day: Drilling and Mucking Competition" held yearly on Labor Day.

On September 10, 2018 I was invited to and on the 24th I was accepted as an associate editorial board member in *Aspects in Mining & Mineral Science (AMMS)* which is an open access publisher on the web that works to broadcast knowledge and to create an archival literature platform.

Previous Work Experience:

Past Positions: Mining Engineer at NIOSH Office of Mine Safety and Health Research (OMSHR)

Project: Ground Control Safety for Deep Vein Mines.

Supervisor: Lewis Martin

Date: 6/2013 – 7/2016

Worked on material property laboratory tests and as a field engineer. Tasks include the testing of rock cores taken from two biaxial stress meter sites and the testing of paste backfill cores obtained at the Lucky Friday Mine in Mullan, Idaho. Field work experience with the installation of closure meters, biaxial stress meters, and instrumented rock bolts. Primary and/or co-author of the field and laboratory results in the form of internal reports and outside publications. Most recent publication was on the results from the paste backfill tests that I presented at the ARMA meeting. Worked on a static and a dynamic shotcrete testing machine to reduce its data to determine the failure strength and energy absorption limit of shotcrete specimens.

Visiting Professor, Montana Tech, Mining Engineering

Date: 8/2012 – 5/2013

Supervisors: David Armstrong, Dept. Chair (Retired) and Pete Knudsen, Dean Engineering (Retired)

The visiting professor position arose from the sudden departure during the summer of 2012 of a professor in the mining department. Using a federal employment rule for the temporary transfer of federal and state government workers, Prof. Camm of Montana Tech submitted paper work that was approved by NIOSH/OMSHR that transferred my work duties from Spokane to Butte, Montana to teach classes for the school year. The work transfer was for the time period from the fall to spring semesters of the 2012 – 2013 school year.

Project: Coal Mine Pillar Design

Supervisor(s): Jeff Whyatt and Heather Lawson

Date: 10/2010 – 7/2012

After completing my dissertation on the cautious blasting of rock, I was assigned to work on the project that was an update of the work of Dr. Chris Mark who developed the ALPS program. The project consisted of adding more data to the empirical ALPS data base. Working on this project, I found a general mathematical method that could be used to calculate failure stress gradients from the average failure strength equations for coal pillars. This method can be used with many average failure strength equations, such as those developed by Hamid Maleki and others, to be incorporated in the LaModel boundary element program developed by Prof. Keith Heasley. The results from this work were published and presented at the 2014 SME annual meeting.

Project: Cautious Blasting of Rock during Drift Development

Supervisor: Steve Signer and (William Hustrulid and M. K. McCarter, Ph.D. Advisors) Date: 10/2001 – 9/2010

One of the tasks on the project became my dissertation topic. The task I was assigned was to determine the length of rock damage caused by a blast stress wave that was produced in the laboratory by a sudden dynamic stress loading using a modification of the split Hopkinson pressure bar. The results of this work were published in my dissertation and in two papers.

Project: Methods for the Prevention of Mine Roof Support Failure

Supervisors: Karl Zipf and Mike Beus

Date: 10/1997 – 9/2001

On this project I finalized the design and completed the paperwork for a strain gaged instrumented split set bolt along with Carl Sunderman the electrical engineer who developed the miniature data logger system (MIDAS) that could be placed inside the strain gaged bolt. The combination of these two parts along with new software developed by Steve Signer led to its patent by the federal government (U.S. Patent # 7,324,007). The instrumented split-set bolt provides strain data from the bolt as applied by the rock acting on it that surrounds the mine opening. The bolt and data logger allow for the calculation of mine-induced bolt loads and providing information on the behavior of the rock mass. Further development of the bolt and data logger along with computer optimization methods may lead to its use in numerical modeling of mine structures.

Department of Energy:

Section: US Department of Energy, Spokane Research Center, Catastrophic Failure Branch

Supervisor: Ken Hay

Date: 10/1996 – 9/1997

Because of political reasons during this time period the U.S. Bureau of Mines was no longer funded and many of its research offices were closed leaving only Albany, Pittsburg, and Spokane. Management was uncertain of project tasks that resulted in a period of independent development of research ideas from many of its engineers. During this period of time I began to develop an instrumented split set bolt along with an electrical engineer who developed a miniature data logger.

Bureau of Mines:

Section: US Bureau of Mines, Spokane Research Center, Mine Development Branch

Supervisors: Ernie Corp and Melvin E. Poad

Date: 7/1986 – 9/1996

My first task was to replace the engineer who was leaving for graduate school. I worked on using acoustic emissions and the Kaiser Effect to determine the past state of stress in rock specimens. Latter in the year I was assigned to work at the Lucky Friday Mine where we measured in situ stress. I performed the elastic and strength material tests on the doorstopper cores and reported the results to the graduate engineer Jeff Whyatt who used this data in his Ph.D. dissertation. Next, I was assigned to work with W.A.E. (While Actively Employed) Prof. William Pariseau with the task of constructing a three-dimensional finite element mesh of the Homestake mine's Ross shaft pillar. This work also involved many years of field instrumentation consisting of stress measurements and extensometer installations equipped with both manual and electronic data loggers. The work resulted in many publications and continued until the closure of the Homestake Mine.

Patents:

US Patent “Instrumented rock bolt, data logger, and user interface system” U.S. Patent #7,324,007. Filed December 27, 2002. Date issued January 29, 2008.

Professional Honors:

1986 ARMA Case Study Rock Mechanics Research Award, with Prof. William G. Pariseau and others.

Professional Memberships and Technical Associations (past and present):

Member, American Rock Mechanics Association (ARMA)
Member, International Society for Rock Mechanics (ISRM)
Member, Society for Mining, Metallurgy, and Exploration (SME)
Member, Northwest Mining Association (NWMA)
Member, University of Utah Faculty Club

Technical Roles (past and present):

ARMA and SME technical paper reviewer.
Vice-president of the SME Columbia Chapter, Spokane, WA.
Associate editorial board member in *Aspects in Mining & Mineral Science (AMMS)*.

Journal, Peer Reviewed, Transactions, & Pre-Print Publications:

Johnson, J. C., Sindhoora, P. B., Tech, Y. L., Lin, C.L., & Miller, J. D. (2019). Energy dissipation during granite core fragmentation by high velocity impact, *Society of Mining, Metallurgy & Exploration (MME) Journal*.

Camm, T.W., **Johnson, J. C.**, & Rosenthal, (2018). Managing engineering talent; challenges to optimize the best and brightest. *Mining Engineering*, January, pgs. 29 – 30.

Benton, D. J., Iverson S. R., Martin, L. A., **Johnson, J. C.**, & Raffaldi, M. J. (2016). Volumetric measurement of rock movement using photogrammetry. *International Journal of Mining Science and Technology*, volume 619, pp. 8.

Martin, L., Clark, C., **Johnson J.**, & Stepan, M. (2015). A new high force and displacement shotcrete test. *Society for Mining, Metallurgy, and Exploration*, Englewood, Colorado, preprint no. 15 – 061, pp. 9.

Dwyer, J., **Johnson, J.**, Whyatt, J. & White, B. (2005). Fragmentation method: a ground-control tool, *Mining Engineering*, March, pgs. 37 – 42.

Williams T., Denton D., **Johnson J.**, Maciosek F., Maslowski, M. (2004). The use of instrumented split-set rock bolts to monitor strain in the walls of a deep underground mine stope. *Transactions of the Society for Mining, Metallurgy, & Exploration*, Littleton, Colorado, preprint no. 04 – 14, pgs. 207 – 214.

Brady, T., **Johnson, J. C.**, Pariseau, W. G., Stahl, M., & Whyatt, J. (2000). Time-dependent rock mass motion at the Homestake mine, Lead, SD. *Society for Mining, Metallurgy, and Exploration*, Littleton, Colorado, preprint no. 00 – 40.

Johnson, J. C., & Orr, S. A. (1990). Rock mechanics applied to shaft pillar mining. *International Journal of Mining and Geological Engineering*, volume 8, pgs. 385 – 392.

Conference Proceedings Publications:

Johnson, J.C., Seymour, B.J., Raffaldi, M.J., & Loken M. C. (2018). Biaxial stressmeter instrument sensitivity to bedded transverse isotropic material. Proceedings of the 52nd U.S. Rock Mechanics / Geomechanics Symposium, Seattle, Washington, June 17 – 20.

Raffaldi, M. J., Chambers, D. J. A., & **Johnson, J. C.** (2017). Numerical study of the relationship between seismic wave parameters and remotely triggered rockburst damage in hard rock tunnels. Proceedings of Deep Mining, Australian Centre for Geomechanics, Perth, Australia, pp. 14.

Seymour, B., Benton, D., Raffaldi, M., **Johnson J. C.**, Martin L., Boltz, M.S., & Richardson, J. (2016). Improving ground control safety in deep vein mines. Proceedings of the 3rd International Symposium on Mine Safety Science and Engineering, Montreal, Quebec, Canada, August 13 – 19, pp. 10.

Raffaldi, M., Benton, D., Martin, L., **Johnson, J.**, & Stepan, M. (2016). Assessing the mechanical behavior of field scale shotcrete panels subjected to large deformations under quasi-static loading. SME Annual Conference and Expo, February 21 – 24, pp. 12.

Johnson, J.C., Seymour, J. B., Martin, L. A., Stepan, M., Arkoosh, A., & Emery, T. (2015). Strength and elastic properties of paste backfill at the Lucky Friday mine, Mullan, Idaho. Proceedings of the 49th US Rock Mechanics / Geomechanics Symposium, San Francisco, California, June 28 - July 1, ARMA 15 – 776, pp. 10.

Martin, L., Clark, C., **Johnson J.**, & Stepan, M. (2015). A new high force and displacement shotcrete test. 2015 SME Annual Meeting, February 15 – 18, Denver, Colorado, February, pp. 9.

Johnson, J. C., Whyatt, J. K., & Loken, M. C. (2014). A generalized method for calculating pillar cell capacities for boundary element modeling of coal mines. Society for Mining, Metallurgy, and Exploration Annual Meeting, Englewood, Colorado. July, pgs. 735 – 749.

Johnson, J. C., Williams, T., & Pierce, P. (2007). The response of cemented backfill to dynamic loads from field observations and split Hopkinson Pressure Bar tests. MINEFILL: Proceedings of the 9th International Symposium on Mining with Backfill, Montreal, Quebec, April 29 - May 2. Canadian Institute of Mining, Metallurgy and Petroleum, pg. 249.

Johnson J. C., Brady, T. C., Sunderman, C., Signer, S., & Bayer, D. (2003). Field test with strain-gauged friction bolts at the Gold Hunter mine, Mullan, Idaho, USA. Proceedings of the 22nd International Conference on Ground Control in Mining, West Virginia University, Morgantown, West Virginia, August 5 – 7, pgs. 233 – 239.

Johnson, J. C., Brady, T., MacLaughlin, M., Langston, R., & Kirsten, H. (2003). In situ stress measurements at the Stillwater mine, Nye, Montana. Proceedings of the 12th Pan-American Conference on Soil Mechanics and Geotechnical Engineering and the 39th U.S. Rock Mechanics Symposium, Massachusetts Institute of Technology, Cambridge, Massachusetts, June, volume 1, pgs. 337 – 344.

Johnson, J. C., Larson, M., Brady, T., Whyatt, J. K., Langston, R. B., & Kirsten, H. (1999). Stress measurement of a jointed rock mass during drift development. Proceedings of the 2nd Southern African Rock Engineering Symposium & International Society of Rock Mechanics, Johannesburg, S. Africa, September 13 – 1, pgs. 94 – 101.

Johnson, J. C., Brady, T., Larson, M., Langston, R., & Kirsten, H. (1999). Use of strain-gauged rock bolts to measure rock mass strain during drift development. Proceedings of the 37th U.S. Rock Mechanics Symposium, Vail, Colorado, June 6 – 9, pp. 497 – 502.

Johnson, J. C., & Poad, M.E. (1989). Premining stability analysis of a shaft pillar at the Homestake mine. Proceedings of the 30th U.S. Symposium, Khair (ed.), Balkema, Rotterdam, pgs. 175 – 182.

Benton, D., Iverson, S., Martin, L., **Johnson, J.**, & Raffaldi, M. (2015). Volumetric measurement of rock movement using photogrammetry. Proceedings of the 34th International Conference on Ground Control in Mining, July 28 - 30, Morgantown, West Virginia, pgs. 265 - 273.

Benton, D., Iverson, S., **Johnson, J.**, & Martin, L. (2014). Photogrammetric monitoring of rock mass behavior in deep vein mining. Proceedings of the 33rd International Conference on Ground Control in Mining, Morgantown, West Virginia, July 29 - 31, pgs. 221 - 227.

Benton, D., Iverson, S., Martin, L., & **Johnson, J.** (2014). Calibration and application of photogrammetric monitoring of rock mass behavior in deep vein mining. Proceedings of the 33rd International Conference on Ground Control in Mining, Morgantown, West Virginia, July 29 - 31.

Iverson, S. R., Hustrulid, W. A., **Johnson, J. C.**, Tesarik, D., & Akbarzadeh, Y. (2009). The extent of blast damage from a fully coupled explosive charge. Proceedings of the 9th International Symposium on Rock Fragmentation by Blasting, FRAGBLAST 9, Granada, Spain, September 13 - 17, pgs. 459 – 468.

Hustrulid, W., & **Johnson, J.** (2008). A gas pressure-based drift round blast design methodology. Proceedings of the 5th International Conference & Exhibition on Mass Mining, Lulea University of Technology, Lulea, Sweden, June 9 – 11, pgs. 657 – 669.

Williams, T., Denton, D., **Johnson, J.**, Maciosek, F., & Maslowski, M. (2004). The use of instrumented split-set rock bolts to monitor strain in the walls of a deep underground mine stope. SME Annual Meeting, Denver, Colorado, February 23 – 25, pp. 7.

Girard, J., Whyatt, J. K., **Johnson, J.**, & White, B. (2003). Fragmentation method: a ground control tool. SME Annual Meeting, February, pp. 6.

Rodriguez, R., Rodriguez, H., Lhamond, M., **Johnson, J. C.**, & Iverson, S. (2002). Field-scale void detection in coal piles using resistivity imaging. Proceedings of the 5th American Rock Mechanics Symposium and the 17th Tunneling Association of Canada Conference, Toronto, Ontario, Canada, July 7 - 10, volume 1 pgs. 415 – 419.

Tesarik, D., **Johnson, J.**, Zipf, K. Jr., Lande, K. (2002). Initial stability study of large openings for the national underground science laboratory at the Homestake mine, Lead, SD. Proceedings of the 5th American Rock Mechanics Symposium and the 17th Tunneling Association of Canada Conference, University of Toronto, Ontario, July 7 - 10, volume 1, pgs. 157 – 163.

Zipf K., Tesarik D., & **Johnson J.** (2002). Empirical and analytical design of large openings at a proposed national underground science laboratory. Proceedings of the 21st International Conference on Ground Control in Mining, August 6 – 8, University of West Virginia, Morgantown, West Virginia, August, pgs. 318 – 327.

Brady, T. M., **Johnson, J. C.**, Laurenti, M. A., Pariseau, W. G., & Stahl M. S (2001). Mining the remaining portion of the Ross shaft pillar. Proceeding of Rock Mechanics in the National Interest. volume I, July, pgs. 395 – 399.

Brady, T., **Johnson, J. C.**, Pariseau, W. G., Stahl, M., & Whyatt, J. (2000). Time-dependent rock mass motion at the Homestake mine, Lead, SD. SME Annual Meeting, Salt Lake City, Utah, February 28 - March 1.

Pariseau, W. G., **Johnson, J. C.**, & Orr, S. A. (1990). Three-dimensional analysis of a shaft pillar at the Homestake mine. Proceedings of the 31st U.S. Rock Mechanics Symposium, Colorado School of Mines, Golden, Colorado, June 18 - 20, pgs. 529 – 536.

Government Publications:

Iverson, S. R., Hustrulid, W. A., & **Johnson, J. C.** (2013). A new perimeter control blast design concept for underground metal/nonmetal drifting applications. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH), RI 9691, publication no. 2013 - 129, February, pgs. 1 – 67.

Johnson, J. C., Pariseau, W. G., Scott, D. F., & Jenkins, F. M. (1993). In situ stress measurements near the Ross shaft pillar, Homestake mine, South Dakota. U.S. Department of the Interior, Bureau of Mines, RI 9446, January, pgs. 1 - 17.

Pariseau, W. G., **Johnson, J. C.**, McDonald, M. M., Poad, M. E. (1996). Rock mechanics study of shaft stability and pillar mining, Homestake mine, Lead, SD (in three parts) 3. Geomechanical monitoring and modeling using UTAH3. U.S. Department of the Interior, Bureau of Mines, RI 9618, January, pgs. 1 - 29.

Pariseau, W. G., **Johnson, J. C.**, McDonald, M. M., Poad, M. E. (1995). Rock mechanics study of shaft stability and pillar mining, Homestake Mine, Lead, South Dakota (in three parts) 2. Mine measurements and confirmation of preliminary results. U.S. Department of the Interior, Bureau of Mines, RI 9576, May, pgs. 1 - 20.

Whyatt, J. K., White, B. G., **Johnson, J. C.** (1995). Strength and deformation properties of belt strata, Coeur d'Alene mining district, ID. U.S. Department of the Interior, Bureau of Mines, RI 9619, December, pgs. 1 - 69.

Pariseau, W. G., **Johnson, J. C.**, McDonald, M. M., Poad, M. E. (1994). Rock mechanics study of shaft stability and pillar mining, Homestake mine, Lead, SD (in three parts) 1. Premining geomechanical modeling using UTAH2. Spokane, U.S. Department of the Interior, Bureau of Mines, RI 9531, August, pgs. 1 - 22.

Other Publications:

Johnson, J. C. (2010). The Hustrulid Bar: A dynamic strength test and its application in the cautious blasting of rock, Ph.D. Dissertation, June, Department of Mining Engineering, University of Utah, Salt Lake City, Utah, pp. 116.

Johnson, J. C. (1986). Stope and pillar width analysis for large diameter blasthole stopes, M.S. Thesis, June, Department of Mining Engineering, University of Utah, Salt Lake City, Utah, pp. 334.